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ABSTRACT

To gather data on the implications of the proposition that intellectual ability should be conceived as multidimensional, 19 different measures, all of which have been employed as selection criteria for programs for the gifted, were used as a basis for selecting 5 students from 2 fifth-grade classes (N=49) for inclusion in a hypothetical program for the gifted. The principal hypothesis, that different students would be selected as a function of the selection technique utilized, was supported. No student was selected by all techniques, seven students were selected by only one technique, and ninety-two percent of the children (N=44) were selected on the basis of one or more technique. It is concluded that communities should be informed of the implications of various selection techniques so that each may be judged on its merits when establishing special programs for talented students. (Author)

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Department of Health, Education, and Welfare

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Abstract

To gather data on the implications of the proposition that intellectual ability should be conceived as multidimensional, 19 different measures, all of which have been employed as selection criteria for programs for the gifted, were used as a basis for selecting 5 students from 2 fifth-grade classes (N = 49) for inclusion in a hypothetical program for the gifted. The principal hypothesis, that different students would be selected as a function of the selection technique utilized, was supported. No student was selected by all techniques, seven students were selected by only one technique, and ninety-two percent of the children (n=44) were selected on the basis of one or more technique. It is concluded that communities should be informed of the implications of various selection techniques so that each may be judged on its merits when establishing special programs for talented students.

ON THE RELATIVITY OF GIFTEDNESS: AN EMPIRICAL STUDY

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The typical study in identification of the gifted has been to investigate the number of children 'missed' or 'misidentified' when the Stanford-Binet Intelligence Test is not used as the sole criterion for giftedness. Pegnato and Birch (1959), for example, attempted to identify gifted children with teacher nominations, honor roll membership, achievement test scores and group intelligence test results; the students chosen on the basis of each criterion were compared with those identified by the Stanford-Binet. The investigators found that no other technique identified the same children as the Stanford-Binet; they therefore recommended the continued use of this instrument as the sole selection criterion for giftedness. Assuming one were to adopt a multidimensional conception of giftedness, Pegnato and Birch's recommendation would not be justified; the various criteria used in the study undoubtedly reflected the use of somewhat different sets of abilities. Continued utilization of the Stanford-Binet as the sole criterion of giftedness would therefore only be justified if those abilities resulting in a high IQ score continue to be judged valuable to the exclusion of others. Thus, one practical implication of a multidimensional conception of intelligence may be to reward different abilities than have previously been valued. This and other possible implications of such a conception of intelligence have not been investigated empirically to any significant extent.

The purpose of the present study was to explore the possibility that one implication of a multidimensional conception of giftedness may be that different children are selected as outstanding depending upon the technique one uses to select them--that is, depending upon the abilities designated as criteria for giftedness. If it is true that the individuals selected vary with the technique used, then it follows that those who benefit from the special opportunities offered by society may vary as well. In order to empirically test this possibility, 19 different identification techniques, all of which have been previously used as selection devices for special programs for the gifted in the schools, were employed as a basis for selecting the top five scorers in each of two suburban elementary school classes (N = 49) for inclusion in a hypothetical special program for gifted students. Since the mean IQ (California Test of Mental Maturity) for these children was 116.3, it did not seem unreasonable to assume that five children from each class would be identified as gifted (in the IQ sense) by traditional tests.

Hypotheses

To some extent, the hypotheses below were arbitrarily chosen; there was no clear deductive process which led to their formulation. An attempt was made to design hypotheses that would, if supported, demonstrate the phenomenon that different individuals are selected for special programs as a result of different techniques being used. In each case, a hypothesis was stated so that unreliability and chance would be unlikely to explain the results. All hypotheses were formu-

lated before the data were analyzed, but not all hypotheses that were formulated are included in the report.

Hypothesis 1. No child would be selected on all 19 criteria. This hypothesis intended to test the commonality among measures which have been used as selection devices.

Hypothesis 2. Some children would be selected on only one criterion. This hypothesis bears on the implications of designating giftedness as performance on a whole set of criteria versus performance on a single criterion. If supported, the hypothesis would suggest that some children would be missed if outstanding performance on several criteria was specified as the criterion.

Hypothesis 3. At least 75% of the children would be selected on one or more criteria. The percentage predicted was selected somewhat arbitrarily. The intent of this hypothesis was to demonstrate, if supported, that most children could be designated as gifted if many measures are used. If three-fourths or more of the students were selected on one or more of the criteria, the results could be taken as supporting the hypothesis that most children (in this population) could be designated as gifted.

Method

Sample

The subjects (S's) were 49 fifth-graders in Woodlake Elementary School, Richfield, Minnesota, school year 1969-1970. Twenty-one S's were from class A (N = 23: 2 S's had insufficient data), and 28 S's were from class B. The mean age of the S's was 10 years, 9.7 months, and the range was from 10 years 5 months to 11 years 7 months as of February, 1970. The mean IQ (California Test of Mental Maturity) was 116.3, and IQ's ranged from 82 to 134. Twenty-five S's were girls, and 24 were

boys.

Measures

The measures used in the study are summarized in Table 1; all of these measures have been used to select students for special programs for the gifted. The school in this study routinely administered the California Test of Mental Maturity and the California Achievement Test, while E administered the remainder. Each measure is described in Table 1.

California Test of Mental Maturity. The California Test of Mental Maturity (CTMM: Sullivan, Clark and Tiegs, 1963) is essentially a measure of general verbal ability. Although it yields eight scores: logical reasoning, spatial relationships, numerical reasoning, verbal concepts, memory, language total, nonlanguage total, and total; only the total score in IQ form was used as a measure of general verbal ability. Such a measure is often used to select students for special programs for the gifted.

California Achievement Test. The California Achievement Test (CAT: Tiegs and Clark, 1963) is a diagnostic battery of academic achievement in reading, arithmetic, and language. The authors of the CAT warn against using too few items for diagnosis: only the three total scores (Reading Total, Arithmetic Total, and Language Total) plus the composite total were included as criteria in the study.

Primary Mental Abilities. The Primary Mental Abilities test (PMA: Thurstone & Thurstone, 1963) yields five subtest scores as well as a composite score. Thurstone maintained that these subtests represented five factors of general intelligence, and since some research has supported this claim, the five factor scores as well as the total score were included. The five subtests are verbal meaning, number facility, spatial relations,

Table 1

Nineteen Criteria Used as Selection Devices

For Hypothetical Program for the Gifted

1. California Test of Mental Maturity (IQ)
2. California Achievement Test (Reading)
3. California Achievement Test (Arithmetic)
4. California Achievement Test (Language)
5. California Achievement Test (Total)
6. Primary Mental Abilities Test (Verbal Meaning)
7. Primary Mental Abilities Test (Number Facility)
8. Primary Mental Abilities Test (Spatial Relations)
9. Primary Mental Abilities Test (Reasoning)
10. Primary Mental Abilities Test (Perceptual Speed)
11. Primary Mental Abilities Test (Total Score)
12. Torrance Tests of Creative Thinking (Pictural Completion: Fluency)
13. Torrance Tests of Creative Thinking (Pictural Completion: Flexibility)
14. Torrance Tests of Creative Thinking (Pictural Completion: Originality)
15. Torrance Tests of Creative Thinking (Pictural Completion: Elaboration)
16. School Grades (Music)
17. School Grades (Art)
18. Teacher nominations (most gifted)
19. Teacher nominations (most creative)

reasoning, and perceptual speed. Maybury and Lesser (1963) developed special programs for the gifted using tests based on primary mental abilities factors.

Creative thinking. Only the Picture Completion figural subtest of form A from Torrance's Tests of Creative Thinking (1966) was included. This test asked S's to complete and label a drawing from a few simple lines, and it yields four subscores: Fluency, Flexibility, Originality, and Elaboration. The Fluency subscore yielded almost no variance, and was thus not included in the analyses.

Teacher's nominations. Each teacher nominated the 5 students who were most "gifted" and the 5 students who were most "creative" in her class; teachers were given no information or assistance with the meaning of the terms. Both teachers had access to the CTMM and CAT scores when they made their nominations, but only one teacher reported that these tests influenced her choices. The other teacher reported using classroom evidence of intellectual curiosity in determining her choices. Since each teacher nominated 5 students, 10 students were selected on the basis of each of these criteria, i.e., double the number selected on any other basis.

Grades. Because there was almost no variation in the distributions of language, science, and math grades, only music and art grades were employed. In music and art, some students received "outstanding" marks; these students were selected, but there were not 5 in each class. Thus, the number of students selected on the basis of grades was only 14 instead of 20 (i.e., 5 students from each class in Music and in Art).

Procedures

From teachers, E (E was the second author) obtained: 1) scores on previously administered (Fall, 1969) standardized tests, 2) prior semester grades, and 3) nominations of the five most gifted students and the five most creative students in each class. E then administered the Primary Mental Abilities Test and the Picture Completion subtest of the Torrance Creativity Tests, in that order, first to one class on a Tuesday, then to the other class on the following Thursday. After scoring the tests and other measures, E determined the students who obtained the top five scores on each of the 19 selection criteria.

Results

Table 2 presents the means and standard deviations of each class on each of the 19 criteria used in the study. Table 3 presents the inter-correlations among the variables in the study. In general the means for the combined classes were above average on the standardized tests. For example, I.Q. scores on the CTMM and PMA were more than a standard deviation above 100, and the percentiles on the CAT were well above 50. The standard deviations of most of the distributions of scores were large, indicating substantial variation; however, the Fluency, Flexibility, and Originality scores on the Torrance subtest as well as the Music and Art grades yielded small standard deviations indicating limited variation. Although there were some differences in means and correlations between classes, these did not appear to merit separate data analyses for each class. Therefore, where possible, data were combined.

Table 2

Means and standard deviations for 17 of the 19 criteria used in the study*

Criterion	CLASS A			CLASS B			COMBINED (A&B)		
	N	X	SD	N	X	SD	N	X	SD
CTMM (IQ)	21	116.19	9.15	28	116.79	12.60	49	116.53	11.25
CAT: Read.	21	77.76	22.85	27	84.52	20.87	48	81.56	22.01
Arith	20	79.10	18.66	28	86.11	16.91	48	83.19	17.99
Lang.	20	79.75	17.43	26	87.62	15.86	46	84.20	17.01
Total	19	83.68	17.38	25	89.16	15.67	44	86.80	16.65
PMA: V.M.	21	111.29	12.49	28	113.32	12.15	49	112.45	12.34
N.F.	21	111.86	7.07	28	112.93	9.49	49	112.47	8.56
S.R.	21	113.62	16.53	28	115.43	16.68	49	114.65	16.64
R.E.	21	112.62	12.52	28	117.29	13.72	49	115.28	13.42
P.S.	21	119.29	6.53	28	114.18	11.55	49	116.37	10.04
Total	21	117.67	9.46	28	118.68	11.49	49	118.24	10.68
TOR: Flu	21	8.86	1.81	28	8.71	1.53	49	8.78	1.66
Flex.	21	6.52	1.76	28	7.18	1.49	49	6.89	1.64
Orig.	21	10.05	2.98	28	10.04	2.77	49	10.04	2.86
Elab.	21	30.43	12.08	28	27.18	10.26	49	28.57	11.19
GRADES: Mu.	21	3.23	0.43	28	3.11	0.31	49	3.16	0.36
Art.	21	3.09	0.30	28	3.14	0.34	49	3.11	0.32

Note: CTMM and PMA scores are deviation I.Q.'s;

CAT scores are percentiles;

Torrance scores are raw scores.

*The two other criteria were teachers' nominations of most "gifted" and most "creative" students.

Table 3

Correlations Among Variables

Variable(N)	CAT READING	CAT MATH.	CAT LANG.	CAT TOTAL	PMA VERBAL	PMA NUM.	PMA SPACE	PMA REAS.	PMA PERC.	PMA TOTAL	TORRANCE FLUENCY	TORRANCE FLEX.	TORRANCE ORIG.	TORRANCE ELAB.
CTMM (49)	71	68	53	67	63	59	36	53	31	65	22	19	03	28
CAT READ. (48)		80	81	95	68	56	29	68	34	71	03	05	-14	13
CAT MATH. (48)			79	93	52	50	32	57	23	58	18	31	10	19
CAT LANG. (46)			92	54	42	41	54	38	64	-04	05	-04		14
CAT TOTAL (44)				60	49	34	60	35	66	08	21	04		17
PMA VERBAL (49)					49	29	53	38	78	-02	-11	-24		28
PMA NUM. (49)						43	64	41	76	25	10	-04		18
PMA SPACE (49)							35	43	61	-11	-18	-18		10
PMA REAS. (49)								35	77	11	01	03		15
PMA PERC. (49)									69	01	-05	01		00
PMA TOTAL (49)										06	-05	-13		21
TORR. FLU. (49)											55	45		23
TORR. FLEX. (49)												29		-06
TORR ORIG. (49)														05

Hypotheses 1 and 2. Figure 1 presents a histogram of the distribution of students identified as the top 5 students on 0 to 19 of the criteria. Of the 49 S's none was selected on all criteria. Only 4 were selected by more than half the criteria (10, 11, 12, and 13 respectively). Clearly, Hypothesis 1, that no individual would be selected by all of the criteria, was supported. Hypothesis 2, that some children would be selected by only 1 criterion, was also supported; 7 S's were selected by only 1 criterion.

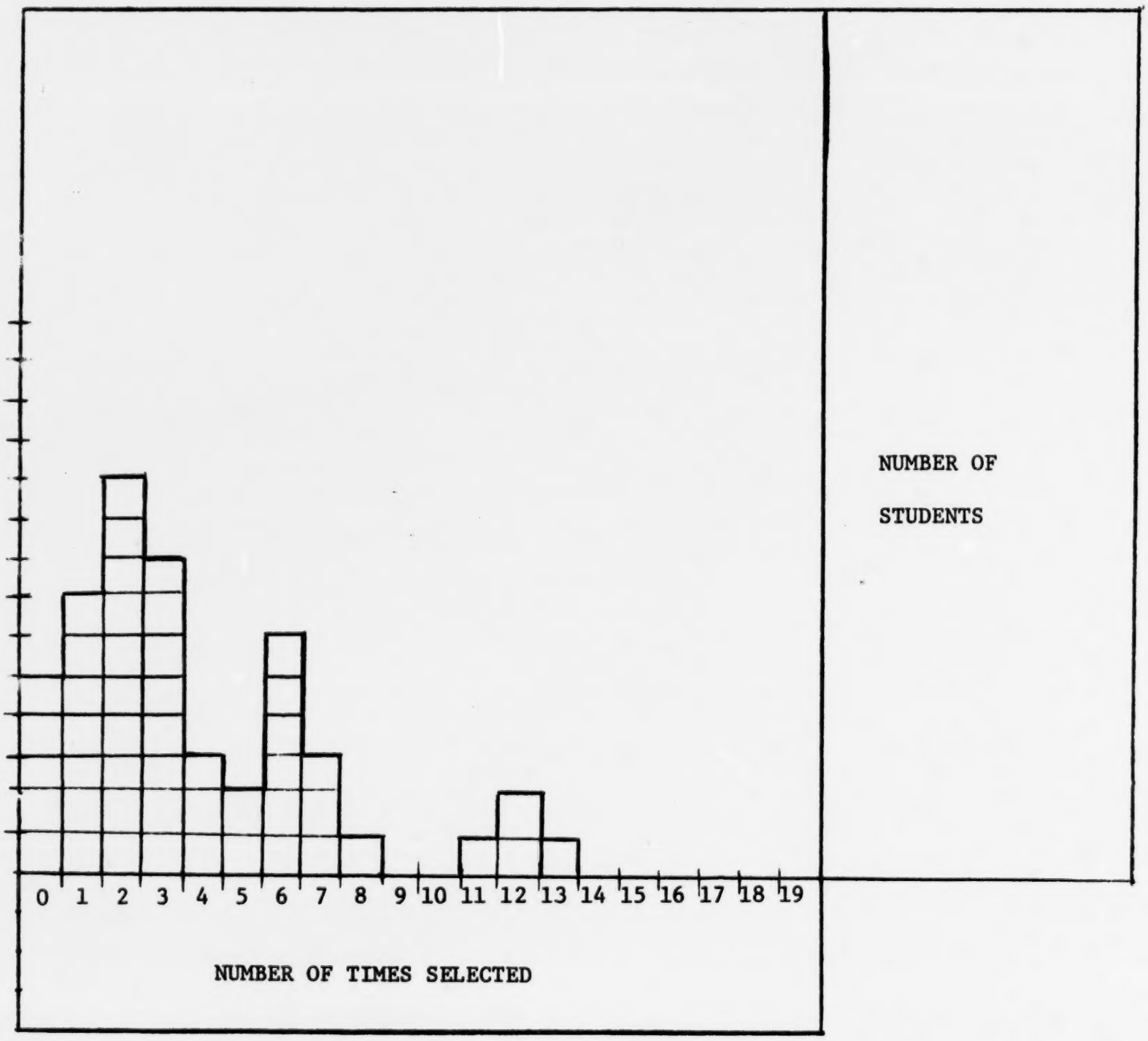
Hypothesis 3. Hypothesis 3 stated that 75% or more of the S's would be selected on the basis of one or more criteria; this hypothesis was supported. Ninety-two percent (n = 44) of the S's were selected by one or more criteria.

Discussion

The purpose of the present study was to gather data bearing on one possible result of the assumption that giftedness should be defined in multidimensional terms. Specifically, the hypothesis tested was that different individuals are selected as gifted as a function of the technique used as the selection criterion. The results of the study supported the hypotheses that no student would be selected by all 19 of the criteria, that some students would be selected by only 1 criterion, and that at least 75% of the students would be selected by 1 or more criteria. Despite the general support found for the hypotheses, a number of cautions should be imposed before drawing conclusions from the study.

First, the sampling procedures were governed more by availability than sound experimental practice. Subjects were two entire classes from a

Figure 1. Histogram of the frequency with which students were selected (19 was the maximum number of times a student could be selected).



suburban elementary school; they were neither randomly selected nor drawn from any specified population. The sample size was small and unrepresentative of much of the population.

Second, a portion of the data used in the study was taken from existing school records, some of which were not up to date. The possible unreliability of this information may have contributed error variance to the results.

Third, of the two teachers of the classes involved in the study, one used school records in making nominations for "most gifted" and "most creative" students, while one did not. For the criteria to be considered independent, teachers should not have seen test scores for their students. However, the effect of this uncontrolled variation would tend to lessen support for the hypotheses rather than spuriously inflate it.

Fourth, chance could have affected the results, especially those bearing on Hypothesis 4 which predicted that 75% or more of the students would be selected on 1 or more of the criteria. If the 19 criteria were independent, each student should have been selected by roughly 2 of the 19 criteria by chance (i.e., $5/49 \times 19 \approx 2$). However, the correlations among the variables (see Table 2 indicate that they are not independent. Also, the distribution of frequencies among the top five scorers (see Figure 1) indicates wide departures from the expected chance frequency; that is, a significant number of students (seven) were selected only once, while many students were selected many more times than chance would dictate. Thus, although chance could undoubtedly have influenced the results, it does not appear to adequately explain them nor does it preclude inferring

support for the hypothesis.

Conclusion. The negative results of such studies as reported by Pegnato and Birch (1959) may be reinterpreted in the light of the findings of the present study. Given the premise that intellectual ability is conceived as multidimensional, Pegnato and Birch were doomed to find no substitute for the Stanford-Binet regardless of the number of measures used. The present study suggests that results such as those found by Pegnato and Birch represent no failure except insofar as they fail to support an outdated, unidimensional theory of intellectual ability. In the light of the findings of the present study, it should be clear that when different criteria are used to define high ability, different abilities--and different individuals--are selected. As shown in the present study, even when the population sampled is relatively homogeneous and above average in IQ, and even when the only criteria are those which have already been used in selecting students for special programs for the gifted, different students may be selected as gifted as a function of the criterion used.

Tuddenham (1962), in a historical review of intelligence research, wrote:

> For the thoughtful reader, the history of research upon intelligence provides an instructive example of the close link between science and the society in which it is rooted..... Real progress began when society set the problem...In short, social needs have seemed to lead, and theoretical developments to follow, the changes in mental tests over the last half century [p. 515]

It is the opinion of the authors that events within society are again causing demands for changes in the criteria by which individual abilities are judged (Friedenberg, 1970). For example, Gallagher (1964) summarized and critiqued the proceedings of a conference on "research trends and needs in educating the gifted." According to this report, there is growing "disillusionment" with current definitions of giftedness; the consensus of the conference was that IQ scores as operational definitions of intelligence may no longer be advisable. The committee recommended moving from omnibus measures of intellectual ability to "more precise measurement of a number of different dimensions of intellect" /p. 47/. Recent court cases challenging the use of tests also are an indication of changes in attitudes toward ability tests.

The results of the present study suggest that different individuals will benefit as a function of different abilities selected as criteria for giftedness (assuming of course that all abilities are not equally valued). Thus, choosing a selection criterion may be a matter of great importance to a community. The future role of the educational psychologist may be to inform the community of the implications of the many criteria that could be used to define high ability, to develop new techniques which better encompass the values of the community, and to develop and implement programs for children who show promise to further these values. In other words, the psychologist may be asked to "give away" his knowledge to the community, as George Miller (1969) has recently argued.

It is certainly the case that educational psychology is just beginning to learn the long-term correlates of various tested abilities, and future research efforts should continue to explore these relationships. It is our conclusion, however, that communities should no longer abdicate to

educational psychology the power and responsibility to influence the selection of their future leaders by the continued use of unidimensional testing techniques, except insofar as each community understands and accepts the implications of continued use of such techniques.

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Footnote

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